WHAT IS CLAIMED IS:

1. A magneto-resistive effect element, comprising:

a first ferromagnetic film;

a second ferromagnetic film; and

a first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film has an effective magnetic thickness of about 2 nm or less.

2. A magneto-resistive effect element according to claim 1, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

3. A magneto-resistive effect element according to claim 1, wherein the second ferromagnetic film is formed of XMnSb, where X is at least one element selected from the group consisting of Ni, Pt, Pd and Cu.

4. A magneto-resistive effect element according to claim 1, wherein the first ferromagnetic film includes:

an amorphous magnetic film, and

a third ferromagnetic film in contact with the first nonmagnetic film and interposed between the amorphous magnetic film and the first nonmagnetic film.

5. A magneto-resistive effect element according to claim 4, wherein the third ferromagnetic film has a thickness of about

0.2 nm or more and about 2 nm or less.

6. A magneto-resistive effect element according to claim 4, wherein the third ferromagnetic film has a thickness of about 0.8 nm or more and about 1.2 nm or less.

7. A magneto-resistive effect element according to claim 4, wherein the amorphous magnetic film includes at least one selected from the group consisting of CoFeB and CoMnB.

8. A magneto-resistive effect element according to claim 1, wherein the first ferromagnetic film includes:

a second nonmagnetic film,

a fourth ferromagnetic film, and

a fifth ferromagnetic film,

wherein the fourth ferromagnetic film and the fifth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the second nonmagnetic film.

9. A magneto-resistive effect element according to claim 8, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have different strengths of saturated magnetization from each other.

10. A magneto-resistive effect element according to claim 8, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have different thicknesses from each other.

11. A magneto-resistive effect element according to claim 10, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have a thickness difference of about 2 nm or less.--

12. A magneto-resistive effect element according to claim 8, wherein the second nonmagnetic film is formed of Ru.

13. A magneto-resistive effect element according to claim 8, wherein the second nonmagnetic film is formed of one of Rh, Ir and Re.

14. A magneto-resistive effect element according to claim 12, wherein the second nonmagnetic film has a thickness of about 0.6 nm or more and about 0.8 nm or less.

15. A magneto-resistive effect element according to claim 8, wherein at least one of the fourth ferromagnetic film and the fifth ferromagnetic film contains at least one element selected from the group consisting of Ni, Co and Fe as a main component.

16. A magneto-resistive effect element according to claim 8, wherein the fourth ferromagnetic film and the fifth ferromagnetic film are magnetization-rotated while being kept anti-parallel to each other.

17. A magneto-resistive effect element according to claim 1, wherein the second ferromagnetic film includes:

a third nonmagnetic film,

a sixth ferromagnetic film, and

a seventh ferromagnetic film,

wherein the sixth ferromagnetic film and the seventh ferromagnetic film are antiferromagnetically exchange-coupled with each other through the third nonmagnetic film.

18. A magneto-resistive effect element according to

claim 17, wherein the third nonmagnetic film is formed of Ru.

19. A magneto-resistive effect element according to claim 17, wherein the third nonmagnetic film is formed of one of Rh, Ir and Re.

20. A magneto-resistive effect element according to claim 18, wherein the third nonmagnetic film has a thickness of about 0.6 nm or more and about 0.8 nm or less.

21. A magneto-resistive effect element according to claim 17, wherein at least one of the sixth ferromagnetic film and the seventh ferromagnetic film contains at least one element selected from the group consisting of Ni, Co and Fe as a main component.

22. A magneto-resistive effect element according to claim 1, wherein the first nonmagnetic film is an insulating film.

23. A magneto-resistive effect element according to claim 22, wherein the insulating film contains at least one selected from the group consisting of Al_2O_3, MgO, a carbide and a nitride.

24. A magneto-resistive effect memory cell, comprising:

a first ferromagnetic film;

a second ferromagnetic film;

a first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film; and

at least one conductive film for causing a magnetization rotation of at least the first ferromagnetic

film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film has an effective magnetic thickness of about 2 nm or less.

25. A magneto-resistive effect memory cell according to claim 24, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

26. A magneto-resistive effect memory cell according to claim 24, wherein the second ferromagnetic film is formed of XMnSb, where X is at least one element selected from the group consisting of Ni, Pt, Pd and Cu.

27. A magneto-resistive effect memory cell according to claim 24, wherein the first ferromagnetic film includes:

an amorphous magnetic film, and

a third ferromagnetic film in contact with the first nonmagnetic film and interposed between the amorphous magnetic film and the first nonmagnetic film.

28. A magneto-resistive effect memory cell according to claim 27, wherein the third ferromagnetic film has a thickness of about 0.2 nm or more and about 2 nm or less.

29. A magneto-resistive effect memory cell according to claim 27, wherein the third ferromagnetic film has a thickness of about 0.8 nm or more and about 1.2 nm or less.

30. A magneto-resistive effect memory cell according to claim 27, wherein the amorphous magnetic film includes at least one selected from the group consisting of CoFeB and CoMnB.

31. A magneto-resistive effect memory cell according to claim 24, wherein the first ferromagnetic film includes:

a second nonmagnetic film,

a fourth ferromagnetic film, and

a fifth ferromagnetic film,

wherein the fourth ferromagnetic film and the fifth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the second nonmagnetic film.

32. A magneto-resistive effect memory cell according to claim 31, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have different strengths of saturated magnetization from each other.

33. A magneto-resistive effect memory cell according to claim 31, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have different thicknesses from each other.

34. A magneto-resistive effect memory cell according to claim 33, wherein the fourth ferromagnetic film and the fifth ferromagnetic film have a thickness difference of about 2 nm or less.

35. A magneto-resistive effect memory cell according to claim 31, wherein the second nonmagnetic film is formed of Ru.

36. A magneto-resistive effect memory cell according to claim 31, wherein the second nonmagnetic film is formed of one of Rh, Ir and Re.

37. A magneto-resistive effect memory cell according to claim 35, wherein the second nonmagnetic film has a thickness of about 0.6 nm or more and about 0.8 nm or less.

38. A magneto-resistive effect memory cell according to claim 31, wherein at least one of the fourth ferromagnetic film and the fifth ferromagnetic film contains at least one element selected from the group consisting of Ni, Co and Fe as a main component.

39. A magneto-resistive effect memory cell according to claim 31, wherein the fourth ferromagnetic film and the fifth ferromagnetic film are magnetization-rotated while being kept anti-parallel to each other.

40. A magneto-resistive effect memory cell according to claim 24, wherein the second ferromagnetic film includes:

a third nonmagnetic film,

a sixth ferromagnetic film, and

a seventh ferromagnetic film,

wherein the sixth ferromagnetic film and the seventh ferromagnetic film are antiferromagnetically exchange-coupled with each other through the third nonmagnetic film.

41. A magneto-resistive effect memory cell according to claim 40, wherein the third nonmagnetic film is formed of Ru.

42. A magneto-resistive effect memory cell according to

claim 40, wherein the third nonmagnetic film is formed of one of Rh, Ir and Re.

43. A magneto-resistive effect memory cell according to claim 41, wherein the third nonmagnetic film has a thickness of about 0.6 nm or more and about 0.8 nm or less.

44. A magneto-resistive effect memory cell according to claim 40, wherein at least one of the sixth ferromagnetic film and the seventh ferromagnetic film contains at least one element selected from the group consisting of Ni, Co and Fe as a main component.

45. A magneto-resistive effect memory cell according to claim 24, wherein the first nonmagnetic film is an insulating film.

46. A magneto-resistive effect memory cell according to claim 45, wherein the insulating film contains at least one selected from the group consisting of Al_2O_3, MgO, a carbide and a nitride.

47. A magneto-resistive effect memory cell according to claim 24, wherein:

at least two layer structures are provided, each layer structure including the first ferromagnetic film, the second ferromagnetic film, and the first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the at least two layer structures are stacked with at least one fourth nonmagnetic film interposed therebetween.

48. A magneto-resistive effect memory cell according to claim 47, wherein the second ferromagnetic films of the at least two layer structures have different magnetic coercive forces from each other.

49. An MRAM, comprising a plurality of magneto-resistive effect memory cells according to claim 24, wherein the plurality of conductive films are arranged in at least one prescribed direction.

50. A magneto-resistive effect element, comprising:

a first ferromagnetic film;

a second ferromagnetic film; and

a nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film includes:

an amorphous magnetic film, and

a third ferromagnetic film in contact with the nonmagnetic film and interposed between the amorphous magnetic film and the nonmagnetic film.

51. A magneto-resistive effect element according to claim 50, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

52. A magneto-resistive effect element according to claim 50, wherein the nonmagnetic film is an insulating film.

53. A magneto-resistive effect element, comprising:

a first ferromagnetic film;

a second ferromagnetic film; and

a first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film includes:

a second nonmagnetic film,

a third ferromagnetic film, and

a fourth ferromagnetic film,

wherein the third ferromagnetic film and the fourth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the second nonmagnetic film.

54. A magneto-resistive effect element according to claim 53, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

55. A magneto-resistive effect element according to claim 53, wherein the third ferromagnetic film and the fourth ferromagnetic film have different strengths of saturated magnetization from each other.

56. A magneto-resistive effect element according to claim 53, wherein the third ferromagnetic film and the fourth ferromagnetic film have different thicknesses from each other.

57. A magneto-resistive effect element according to claim 53, wherein the third ferromagnetic film and the fourth ferromagnetic film are magnetization-rotated while being kept anti-parallel to each other.

58. A magneto-resistive effect element according to claim 53, wherein the second ferromagnetic film includes:

a third nonmagnetic film,

a fifth ferromagnetic film, and

a sixth ferromagnetic film,

wherein the fifth ferromagnetic film and the sixth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the third nonmagnetic film.

59. A magneto-resistive effect element according to claim 53, wherein the first nonmagnetic film is an insulating film.

60. A magneto-resistive effect memory cell, comprising:

a first ferromagnetic film;

a second ferromagnetic film;

a first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film; and

at least one conductive film for causing a magnetization rotation of at least the first ferromagnetic film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable the a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film includes:

an amorphous magnetic film, and

a third nonmagnetic film in contact with the first nonmagnetic film and interposed between the amorphous film and the first nonmagnetic film.

61. A magneto-resistive effect memory cell according to claim 60, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

62. A magneto-resistive effect memory cell according to claim 60, wherein the first nonmagnetic film is an insulating film.

63. A magneto-resistive effect memory cell according to claim 60, wherein:

at least two layer structures are provided, each layer structure including the first ferromagnetic film, the second ferromagnetic film, and the first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the at least two layer structures are stacked with at least one second nonmagnetic film interposed therebetween.

64. A magneto-resistive effect memory cell according to claim 63, wherein the second ferromagnetic films of the at least two layer structures have different magnetic coercive forces from each other.

65. An MRAM, comprising a plurality of magneto-resistive effect memory cells according to claim 60, wherein the plurality of conductive films are arranged in at least one

prescribed direction.

66. A magneto-resistive effect memory cell, comprising:

a first ferromagnetic film;

a second ferromagnetic film;

a first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film; and

at least one conductive film for causing a magnetization rotation of at least the first ferromagnetic film,

wherein:

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field, and

the first ferromagnetic film includes:

a second nonmagnetic film,

a third ferromagnetic film, and

a fourth ferromagnetic film,

wherein the third ferromagnetic film and the fourth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the second nonmagnetic film.

67. A magneto-resistive effect memory cell according to claim 66, wherein at least one of the first ferromagnetic film and the second ferromagnetic film has a magnetization direction in a planar direction thereof.

68. A magneto-resistive effect memory cell according to claim 66, wherein the third ferromagnetic film and the fourth ferromagnetic film have different strengths of saturated magnetization from each other.

69. A magneto-resistive effect memory cell according to claim 66, wherein the third ferromagnetic film and the fourth ferromagnetic film have different thicknesses from each other.

70. A magneto-resistive effect memory cell according to claim 66, wherein the third ferromagnetic film and the fourth ferromagnetic film are magnetization-rotated while being kept anti-parallel to each other.

71. A magneto-resistive effect memory cell according to claim 66, wherein the second ferromagnetic film includes:

a third nonmagnetic film,

a fifth ferromagnetic film, and

a sixth ferromagnetic film,

wherein the fifth ferromagnetic film and the sixth ferromagnetic film are antiferromagnetically exchange-coupled with each other through the third nonmagnetic film.

72. A magneto-resistive effect memory cell according to claim 66, wherein the first nonmagnetic film is an insulating film.

73. A magneto-resistive effect memory cell according to claim 66, wherein:

at least two layer structures are provided, each layer structure including the first ferromagnetic film, the second ferromagnetic film, and the first nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the at least two layer structures are stacked with at least one fourth nonmagnetic film interposed

therebetween.

74. A magneto-resistive effect memory cell according to claim 73, wherein the second ferromagnetic films of the at least two layer structures have different magnetic coercive forces from each other.

75. An MRAM, comprising a plurality of magneto-resistive effect memory cells according to claim 66, wherein the plurality of conductive films are arranged in at least one prescribed direction.

76. A method for writing information to and reading information from a magneto-resistive effect memory cell, the magneto-resistive effect memory cell including:

a first ferromagnetic film,

a second ferromagnetic film,

a nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

at least one conductive film,

wherein the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field,

the method comprising the steps of:

causing a first current to flow in the at least one conductive film to cause a magnetization rotation of at least the first ferromagnetic film, thereby writing information in the magneto-resistive effect memory cell; and

causing a second current to flow in the first ferromagnetic film, the nonmagnetic film, and the second ferromagnetic film; and causing a third current, which is a combination of a positive bias current and a negative bias

current, to flow in the at least one conductive film, thereby reading a voltage value corresponding to the second current and thus reading information written in the magneto-resistive element memory cell.

77. A method according to claim 76, wherein the third current has a level which causes a magnetization rotation of the first ferromagnetic film but does not cause a magnetization rotation of the second ferromagnetic film.

78. A method for writing information to and reading information from an MRAM including a plurality of magneto-resistive effect memory cells, each magneto-resistive effect memory cell including:

a first ferromagnetic film,

a second ferromagnetic film,

a nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and at least one conductive film,

wherein the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field,

the plurality of conductive films being arranged in at least one prescribed direction, the method comprising the steps of:

causing a first current to flow in the at least one conductive film of a first magneto-resistive effect memory cell of the plurality of magneto-resistive effect memory cells to cause a magnetization rotation of at least the first ferromagnetic film of the first magneto-resistive effect memory cell, thereby writing information in the first magneto-resistive effect memory cell; and

causing a second current to flow in the first ferromagnetic film, the nonmagnetic film, and the second ferromagnetic film of the first magneto-resistive effect memory cell; and causing a third current, which is a combination of a positive bias current and a negative bias current, to flow in the at least one conductive film of the first magneto-resistive effect memory cell, thereby reading a voltage value corresponding to the second current and thus reading information written in the first magneto-resistive effect memory cell.

79. A method according to claim 78, wherein the third current has a level which causes a magnetization rotation of the first ferromagnetic film but does not cause a magnetization rotation of the second ferromagnetic film.

80. A method according to claim 78, further comprising the step of causing a fourth current to flow in the at least one conductive film of a second magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell, the fourth current flowing in a direction for canceling a magnetic field leaked to a third magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell.

81. A method according to claim 80, wherein the second magneto-resistive effect memory cell is identical with the third magneto-resistive effect memory cell.

82. A method for reading information from a magneto-resistive effect memory cell, the magneto-resistive effect memory cell including:

a first ferromagnetic film,

a second ferromagnetic film,

a nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

at least one conductive film,

wherein the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film by an external magnetic field,

the method comprising the step of:

causing a first current to flow in the first ferromagnetic film, the nonmagnetic film, and the second ferromagnetic film; and causing a second current, which is a combination of a positive bias current and a negative bias current, to flow in the at least one conductive film, thereby reading a voltage value corresponding to the first current and thus reading information written in the magneto-resistive effect memory cell.

83. A method according to claim 82, wherein the second current has a level which causes a magnetization rotation of the first ferromagnetic film but does not cause a magnetization rotation of the second ferromagnetic film.

84. A method for reading information from an MRAM including a plurality of magneto-resistive effect memory cells, each magneto-resistive effect memory cell including:

a first ferromagnetic film,

a second ferromagnetic film,

a nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

at least one conductive film,

wherein the first ferromagnetic film has a magnetization more easily rotatable than a magnetization

of the second ferromagnetic film by an external magnetic field,

the plurality of conductive films being arranged in at least one prescribed direction, the method comprising the step of:

causing a first current to flow in the first ferromagnetic film, the nonmagnetic film, and the second ferromagnetic film of a first magneto-resistive effect memory cell of the plurality of magneto-resistive effect memory cells; and causing a second current, which is a combination of a positive bias current and a negative bias current, to flow in the at least one conductive film of the first magneto-resistive effect memory cell, thereby reading a voltage value corresponding to the first current and thus reading information written in the first magneto-resistive effect memory cell.

85. A method according to claim 84, wherein the second current has a level which causes a magnetization rotation of the first ferromagnetic film but does not cause a magnetization rotation of the second ferromagnetic film.

86. A method according to claim 84, further comprising the step of causing a third current to flow in the at least one conductive film of a second magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell, the third current flowing in a direction for canceling a magnetic field leaked to a third magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell.

87. A method according to claim 86, wherein the second magneto-resistive effect memory cell is identical with the

third magneto-resistive effect memory cell.

88. A method for writing multiple levels of a signal to and reading multiple levels of a signal from a magneto-resistive effect memory cell, the magneto-resistive effect memory cell including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film,

the method comprising the steps of:

causing a first current in the at least one conductive film to cause a magnetization rotation of at least one of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures, or to cause a magnetization rotation of none of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures, thereby writing multiple levels of a signal in the magneto-resistive effect memory cell; and

causing a second current to each of the at least two layer structures to compare a resistance value corresponding to the second current and a reference resistance value, thereby reading the multiple levels of the signal written in the magneto-resistive effect memory cell.

89. A method according to claim 88, further comprising the step of causing a current which rises in a gradually increasing manner to flow in the at least one conductive film.

90. A method for writing multiple levels of a signal to a magneto-resistive effect memory cell, the magneto-resistive effect memory cell including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film,

the method comprising the steps of:

causing a first current to flow in the at least one conductive film to cause a magnetization rotation of at least one of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures, or to cause a magnetization rotation of none of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures, thereby writing multiple levels of a signal in the magneto-resistive effect memory cell.

91. A method for reading multiple levels of a signal from

a magneto-resistive effect memory cell, the magneto-resistive effect memory cell including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film,

the method comprising the steps of:

causing a first current to flow in each of the at least two layer structures to compare a resistance value corresponding to the first current and a reference resistance value, thereby reading multiple levels of a signal written in the magneto-resistive effect memory cell.

92. A method according to claim 91, further comprising the step of causing a current which rises in a gradually increasing manner to flow in the at least one conductive film.

93. A method for writing multiple levels of a signal to and reading multiple levels of a signal from an MRAM including a plurality of magneto-resistive effect memory cells, each magneto-resistive effect memory cell including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film,

the plurality of conductive films being arranged in at least one prescribed direction, the method comprising the steps of:

causing a first current to flow in the at least one conductive film of a first magneto-resistive effect memory cell of the plurality of magneto-resistive effect memory cells to cause a magnetization rotation of at least one of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures of the first magneto-resistive effect memory cell, or to cause a magnetization rotation of none of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures of the first magneto-resistive effect memory cell, thereby writing multiple levels of a signal in the first magneto-resistive effect memory cell; and

causing a second current to flow in each of the at least two layer structures of the first magneto-resistive effect memory cell to compare a resistance value corresponding to the second current and a reference resistance value, thereby reading the multiple levels of the signal written in the first magneto-resistive effect memory cell.

94. A method according to claim 93, further comprising the step of causing a current which rises in a gradually increasing manner to flow in the at least one conductive film.

95. A method according to claim 93, further comprising the step of causing a third current to flow in the at least one conductive film of a second magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell, the third current flowing in a direction for canceling a magnetic field leaked to a third magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell.

96. A method according to claim 95, wherein the second magneto-resistive effect memory cell is identical with the third magneto-resistive effect memory cell.

97. A method for writing multiple levels of a signal in an MRAM including a plurality of magneto-resistive effect memory cells, each magneto-resistive effect memory cell including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second

ferromagnetic film,

the plurality of conductive films being arranged in at least one prescribed direction, the method comprising the steps of:

causing a first current of flow in the at least one conductive film of a first magneto-resistive effect memory cell of the plurality of magneto-resistive effect memory cells to cause a magnetization rotation of at least one of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures of the first magneto-resistive effect memory cell, or to cause a magnetization rotation of none of the first ferromagnetic film and the second ferromagnetic film of each of the at least two layer structures of the first magneto-resistive effect memory cell, thereby writing multiple levels of a signal in the first magneto-resistive effect memory cell.

98. A method according to claim 97, further comprising the step of causing a second current to flow in the at least one conductive film of a second magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell, the second current flowing in a direction for canceling a magnetic field leaked to a third magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell.

99. A method according to claim 98, wherein the second magneto-resistive effect memory cell is identical with the third magneto-resistive effect memory cell.

100. A method for reading multiple levels of a signal from an MRAM including a plurality of magneto-resistive effect memory cells, each magneto-resistive effect memory cell

including:

at least two layer structures;

at least one first nonmagnetic film interposed between the at least two layer structures; and

at least one conductive film,

wherein:

each of the at least two layer structures includes a first ferromagnetic film, a second ferromagnetic film, and a second nonmagnetic film interposed between the first ferromagnetic film and the second ferromagnetic film, and

the first ferromagnetic film has a magnetization more easily rotatable than a magnetization of the second ferromagnetic film,

the plurality of conductive films being arranged in at least one prescribed direction, the method comprising the steps of:

causing a first current to flow in each of the at least two layer structures of a first magneto-resistive effect memory cell of the plurality of magneto-resistive effect memory cells to compare a resistance value corresponding to a the first current and a reference resistance value, thereby reading multiple levels of a signal written in the first magneto-resistive effect memory cell.

101. A method according to claim 100, further comprising the step of causing a current which rises in a gradually increasing manner to flow in the at least one conductive film.

102. A method according to claim 100, further comprising the step of causing a second current to flow in the at least one conductive film of a second magneto-resistive effect

memory cell other than the first magneto-resistive effect memory cell, the second current flowing in a direction for canceling a magnetic field leaked to a third magneto-resistive effect memory cell other than the first magneto-resistive effect memory cell.

103. A method according to claim 102, wherein the second magneto-resistive effect memory cell is identical with the third magneto-resistive effect memory cell.